employed in the investigations on which the view is based.[1] Considering that chlorophyll bodies and plastids generally are unknown in hyphæ of all kinds, and in view of the recent researches on the part played by nuclei in cell formation, we had a right to expect some allusion to these matters in a research dated 1884. As regards the optical powers employed, two instances will suffice. Fig. 7 is stated to be highly magnified; 7*a*, a more highly magnified part thereof, is only enlarged 275 diameters, and this is the highest power used! Fig. 7*a* is stated to show "the separated gonidia [of *Psoroma hypnorum*] inclosed in the cellules [of the cortex], after Nylander." It represents, in fact, a homogeneous green spot separated by a narrow blank space from the concentric double black outline. Fig. 2*a*, "Gonidia [of *Lecanora gibba*], as seen inclosed in the cellules of the pseudo-parenchyma, magnified about 270 diameters," only differs from 7*a* in the black outline being single instead of double; and these two figures are the only ones professing to illustrate the actual formation of the gonidia!

So much for the formation of the gonidia from the hyphæ or the derived cellular cortical layer. Of the inverse origin of hyphæ from gonidia, the author gives no hint; yet, surely this should be taken into consideration also in a complete account of the lichen as a simple organism? Mr. Crombie states that "*Sirosiphon*, *Hormosiphon*, *Scytonema*, *Stigonema*, *Cora*, *Dichonema*, *Chroolepus* or *Trentepohlia*, *Nostoc* and *Glœocapsa* (at least in part), *Gongrosira* and *Phyllactidium*, have now to be removed from the class of the algæ," having, "in consequence of the discovery of their fructification, been proved to be lichens." Such papers as those of Bornet and Johow are in complete discordance with this view, except as regards *Cora* and *Dictyonema* (or *Dichonema*). Mr. Crombie seems to be unaware that the discovery of a *hymenomycetous* fructification in these very genera of lichens by Mattirolo ("Contribuzniohe allo Studio del genere *Cora*," in *Nuov. Giorn. Bot. Ital.*, vol. xiii. 1881), confirmed and extended by Johow, is regarded by most botanists as the very coping-stone of the symbiosis theory founded by De Bary and Schwendener; but their papers are not referred to.[2]

I may say that I have personally hunted through many a *Nostoc* colony without finding a trace of hyphæ; and there is no record of the transmutation of a *Nostoc*-cell into a lichen or fungus hypha. Yet this is wanting to show that *Nostoc* is the immature form of a lichen. So I have frequently seen *Glœocapsa* colonies permeated by hyphæ, which could often be traced to septate (probably lichen) spores, but, like all other observers, never to a green cell. *Gongrosira* has been demonstrated by Stahl to be at least in part the resting form of *Vaucheria* ("Die Ruhezustand der *Vaucheria geminata*," in *Bot. Zeit.*, 1879, p. 129, t. ii.), and must henceforward rank only as a form-genus. *Phyllactidium* is another form-genus, comprising young forms of genera so distinct as *Coleochæte* and *Mycoidea*, Cunn.

I have abstained from reviewing the purely critical appreciation of the works of Schwendener, Bornet, Rees, Stahl, &c., though Mr. Crombie's treatment thereof seems to me decidedly offhand. But I trust that in my remarks on his positive arguments in favour of the unitary theory of lichens, I have not exceeded the bounds set by the respect all must feel towards his honest and arduous work on the classification of so difficult a group.

MARCUS M. HARTOG

Queen's College, Cork

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—A temporary Pathological Laboratory has been fitted up for Prof. Roy, and it is proposed to vote 400*l.* for apparatus.

Downing College has now a capital opportunity of appointing a scientific man as Master, owing to the death of Dr. Worsley.

Mr. C. Dixon has been appointed a Demonstrator of Mechanism and Applied Mechanics in place of Mr. J. H. Nicholls, resigned.

A discussion took place last Friday on the Report as to a new Chemical Laboratory. Prof. Liveing stated in forcible terms the inadequacy of the present laboratories, which were inferior to those of many schools. He could not classify students; he had no class-rooms, and literally no provision for research. Cambridge was subjected to severe competition; a new University in the north of England was supplying considerable means of research; and before long it must be expected that the plans for a Teaching University for London would be carried out. It would be economical to make good provision while they were about it. The estimated sum of 30,000*l.* was as low as would provide suitable accommodation. The chief objections urged against the proposal were as to the magnitude of the sum in proportion to other requirements and to the funds at the disposal of the University. Prof. Humphry made a vigorous appeal to men of wealth, who might find in Cambridge many objects worthy of their munificence. Cambridge laboured under the double disadvantage of being poor and of being thought rich.

THE following courses of Lectures and Demonstrations in special branches of Physics will be given in the Physical Lecture Room and Laboratories of the Science Schools, South Kensington:—(1) Connection between Sound and Music. Six Lectures and Demonstrations by R. Mitchell, at 2 p.m. on February 23, 25, 27, March 2, 4, 6. (2) Certain Optical Measurements. Eight Lectures and Demonstrations by H. H. Hoffert, B.Sc., at 2 p.m. on March 9, 11, 13, 16, 18, 20, 23, 25. (3) Electrical Measurements. By C. V. Boys, A.R.S.M., at 2 p.m. on April 13, 15, 17, 20, 22, 24, 27, 29; May 1, 4. (4) The Chemical Action of Light. By Capt. W. de W. Abney, F.R.S., at 2 p.m. on May 6, 8, 11, 13, 15, 18, 20, 22. The above courses are open without fee to all second and third years' regular students of the Normal School of Science and Royal School of Mines, on their giving to the Registrar a written recommendation from the Professor or Lecturer whose classes they are attending at the time. The fee to others attending the courses are: for each separate course, 10*s.*; for all the courses, 30*s.* Such fees are payable in advance to the Registrar of the Normal School of Science and Royal School of Mines. These courses will only be given if a certain number of applications are made a week before February 23. Those intending to join are therefore requested to do so as soon as convenient. All the courses are open to women.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 29.—"On the Structure and Development of the Skull in the Mammalia. Part III. Insectivora." By W. K. Parker, F.R.S.

Although this paper is confessedly only a fraction of what is necessary to be done in this polymorphic order, it shows at least how difficult a group it is to handle. For the Insectivora are set in the midst of the other mammalia—low and high. They might be called the biological stepping-stones from the Metatheria to the Eutheria.

One thing can be done, even now, with our present fragmentary knowledge of the structure and development of the insectivorous types—we can assure ourselves that these types are immediately above the Marsupials, that they have the bats (Chiroptera) obliquely above them, that their nearest relations must be sought for amongst extinct Eocene forms, and that, lowly as they are, and arrested and often dwarfed to the uttermost (so that nature could not safely go further in that direction), they are rich in prophetic characters that have come to perfection in larger and nobler types.

I think it will not be denied that in the ascent of the types the Chiroptera are above the Insectivora, and, as it were, a sort of special "new leader" from that stock, and that the Insectivora are more or less transformed modifications of the marsupial type. I suspect that the existing Insectivora just yield the zoologist one of his groups of types classed together because he knows not what else to do with them; they are not a proper, clear, special branch or "leader" of the mammalian life-tree. They form one group under one designation, just as the *poor* of this metropolis form a group; their special mark is simply lowliness; they differ *inter se* almost as much as the whole remainder above them differ. The higher forms, however, because of their elevation, can afford to be sub-divided again into order after order. If we could descend and see the transforming and newly transformed Placentalia of the Eocene epoch, then the morphologist and the zoologist would find common ground; the taxonomy of the latter, however, would be as useless as the titles and distinctions of modern society to some undeveloped race of savage men.

The best type of Insectivore for general comparison is the hedgehog (*Erinaceus europæus*), as it shows the least suppression of parts, and the best development of that which is diagnostic, so to speak, of the order. In it the great investing bones of the skull are similar to those of the marsupial, but the nasal and squamosals are smaller, and the frontals are larger. In the hard palate there is a considerable relapse, as in marsupials, certain tracts of bone being absorbed, but it has no mesopterygoids, and only *five* vomers, yet the anterolateral pair are well developed. Moreover, the tympanic region has only one annulus, the outer bone; there is no separate os-bullæ. Instead of the latter there is a crescentic shell of bone which grows from the basisphenoid, greatly increasing the size of the tympanic cavity. In the endoskeleton in front of the tympanic cavity there is a remarkable ridge of bone growing outwards from the alisphenoid. That ridge is the remnant of the alisphenoidal tympanic wing of the marsupial, and the shell of bone growing from the basisphenoid is the same morphological element as the separate os-bullæ, but it has lost its independence. The higher mammalian type is fully reached in the thorough freedom of the alisphenoid from the general cranial wall. This character, indeed, is intensified into the special diagnostic of an insectivore, for it lies almos, wholly outside the orbitosphenoid. Here the sphenoidal fissuret which in this case lets out the second branch of the fifth, but not the optic nerve—that nerve having its own foramen in the orbitosphenoid—is not a mere gap, but a *side passage*, or a sort of sphenoidal corridor, right and left. In these things the hedgehog is higher than the marsupial, but in some others it is lower, or more archaic. These latter characters, which suggest an uprise from a more general type than the existing metatheria, are—

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[1] The wonderful results obtained by Mink and Müller in their researches on the "Microgonidia of Lichens" show that *high powers alone* do not suffice for scientific investigation. Mr. Crombie has rightly rejected their views.

[2] Johow's could hardly have reached England before the composition of Mr. Crombie's paper. Mattirolo's dates from 1881.

(1) The development of solid hyaline cartilage in the pterygoid region, a remnant of the pterygo-quadrate of the Ichthyopsida.

(2) The presence of a persistent pituitary hole, which is connected with a curiously specialised structure only seen in typical insectivores, namely, a hollowing out of the basis cranii beneath the pituitary region.

(3) A third archaic character, not seen in the existing marsupials, is the huge relative size, long persistence, and separate distal ossification of Meckel's cartilage, so that in the embryo hedgehog, and even in the nestling, the primary lower jaw is as large as in fishes generally, scarcely excepting the Selachians.

The ossicula auditûs are typically Eutherian; we have lost the imperforate stapes or columella, the interhyal is very small or absent, and the malleus and incus are much like what we find in the higher mammals generally. The pneumaticity of the skull is much reduced: the olfactory region is almost double the relative size of that of a Marsupial. In the head of another family of the Insectivores, namely, the mole (*Talpa europæa*), there is much that is in accord with what is found in its distant relation, the hedgehog, but in it there are evident signs of degradation and of relapse into what is Marsupial in character. The nasal labyrinth is relatively immense, and the skull-walls below, laterally, and behind are as exquisitely pneumatic as in the flying Marsupial (*Petaurus*), the bird, or the crocodile. The swollen basis cranii, all air galleries within, is so excavated that the hinder sphenoid, both base and wings, largely helps the flat single tympanic to form the drum cavity. The pituitary hole does not exist, but there is a considerable pterygoid cartilage. The ossicula *in the adult* are normal, but a curious special character is seen in the ossification, in the young, three parts grown, of the sheath of the stapedial artery, which for a time holds the stapes in its place. It is, however, absorbed afterwards, but remains in the related genus *Myogale*. In nearly half-grown young moles the malleus is quite like that of the marsupials; it is an evident "articulare," with copious wild growths of bone, sub-distinct, which answer to the "angulare" and "supra-angulare" of a reptile or bird. This malleus in its articular part has two endosteal and one ectosteal bony centre.

Meckel's cartilage, long continuous with the malleus, is nearly as massive as in the hedgehog, and has a more distinct separate ossification in its sub-distal part, a long, independent, but temporary *hypobranchial bone*.

The mole shows a most remarkable development of the endocranium, which, twenty years ago, suggested to me that its skull retained unmistakable monotrematous characters. In large young of the *Echidna* and *Ornithorhynchus* the solidity of the chondrocranium is immense, like that of a *Chimæroid* Selachian. and the investing bones are thin and splintery. I have not made out the mode of ossification of the inner skull in those types, but in *spirit*, if not in the *letter*, the mole agrees with them, that is, in the great development and independence of the inner skull. The opisthotic bone ossifies the normal petro-mastoid region, whilst the prootic bony centre begins in its right place on the front edge of the cartilaginous capsule, and then runs away from it into the wall of the skull. Thus there is a large bony tract in the temporal region between the squamosal and the large interparietal, which is not one of the ordinary ectocranial bones, but an endo-cranial bony tract overshadowing and yet imitating the true temporal bone or squamosal. This bone is represented by three separate centres in osseous fishes, namely, the prootic, pterotic, and sphenotic, whilst their true auditory region is partly ossified by the epiotic and opisthotic; the epiotic is only sub-distinct in the mole. If I am asked why I dive so far down for my illustrations, instead of being satisfied with what reptiles and birds would show me, my answer is that these are often of no use for comparison, as they are as thoroughly specialised for their own mode of life as the Mammalia generally, and are as completely, and often more completely, transformed from the original archaic type or types. Thus the mole, like most of the Edentata lately described by me, suggests as the root stock of the Eutheria generally, not marsupials (Metatheria), as we know them, but prototherian forms in which, in ages long past, the existing monotremes and marsupials had a common origin. The shrew (*Sorex vulgaris*) represents another family of the Insectivores, the Soricidæ. It combines the characters of the mole and hedgehog with peculiarities of its own that are manifestly due to dwarfing; many things are suppressed, as if there was not room in so small a skull for their development. The pituitary hole reappears, and the pterygoid cartilage, but the tympanic wings of the alisphenoid and of the basisphenoid are gone. The malleus does not show itself so unmistakably marsupial, and Meckel's cartilage is slenderer. The sheathing alisphenoids are well seen, the squamosal is extremely small, low down, and devoid of a jugal process; the jugal bone is suppressed. The prootic wing is present, as in the mole.

So much for the British representatives of these families of the Insectivora—the Erinaceidæ, Talpidæ, and Soricidæ. The Mascarene Insectivora are so evidently related to each other as to suggest at once a common origin; these are the Centetidæ, the largest of which is the Tenrec (*Centetes ecaudatus*); the other genera treated of in this paper are *Ericulus*, *Hemicentetes*, and *Microgale*.

These are almost typical Insectivora, but they agree with the shrews in having the jugal bone suppressed; they are also more marsupial than our native kinds. In these types the normal characters of the skull of an insectivore are combined with a remarkable marsupial tympanic wing to the alisphenoid, but the os-bullæ is not free, it is merely an outgrowth of bone from the basisphenoid. The pituitary hole is present and in the large species the curious basi-cranial excavation; the optic foramina also and the sphenoidal side passages are remarkably developed. As in the genus *Phalangista* among the marsupials, and *Sorex* and *Talpa* among the British Insectivora, the antero-lateral vomers are evidently suppressed, or have a very temporary independent existence: the postero-lateral vomers are rather small, as in the hedgehog. In the embryo the main vomer is *relatively* as large as in the embryo whale, and is curiously cellular or spongy. In nestlings this one primary azygous centre has broken up into three: one, the largest, above, and two lesser below, sheathing it, as it sheaths, the base of the nasal septum. Now this multiplication of the vomers proper is thoroughly marsupial. It is unique, as far as I know, in the mode of its sub-division into secondary bony centres. In the African (Continental) family the elephant or jumping shrews (Macroscelidæ), as illustrated by the largest forms, *Petrodromus* and *Rhynchocyon*, we have a curious mixture of mar upial or metatherian and eutherian characters, so that they are aberrant as insectivores; the marsupial characters are most remarkable. These are: (1) the absence of an optic foramen in the embryo; (2) the alisphenoids scarcely overlapping the orbitosphenoids; (3) the tympanic wings of the alisphenoids are well marked, hollow shells in the embryo; (4) large antero-lateral vomers and postero-lateral vomers as large as in average marsupials, and, as in many of them, meeting and uniting at the mid-line; (5) a large distinct "os-bullæ," which makes a tympanic cavity as large as, and much like that of, *Petaurus* or *Phascolarctos*. On the high eutherian side we have, in the embryo, frontals as large as the parietals, and, strangest of all mammalian specialisation, a long *proboscis*, composed of thirty double rings of cartilage, a structure quite similar to the proboscis of an elephant. The mesopterygoids are suppressed, but the pituitary hole is present.

I now come to a type for which no place can be found in our systems of zoology, but for which the late Prof. Peters, in despair, lodged with the Insectivora; I refer to the flying cat (*Galeopithecus*). This genus forms a family by itself, and yet has only two species; it should form an order, as the Hyrax does.

These two species of flying mammals are full of *remnants* of what is old, and *rudiments* of the *new*. I put them between the most archaic (marsupials) and some of the most curiously modified Eutheria, the frugivorous bats, and survey them from these two widely separate standpoints; but they possess that which neither phalanger nor bat will account for or explain.

With a flat, outspread, foliaceous skull, as completely ankylosed as that of any bird, and as thoroughly pneumatic in its post-orbital region, we have one of the largest and most perfect *hard palates;* with the upper incisors partly suppressed, the lower incisors well developed and utterly unique, and the premolars and molars strong for grinding. The cheek-bones and the squamosals are large and thoroughly marsupial, so are the small external pterygoid processes and internal pterygoid bones, and the very large mesopterygoids. I find no antero-lateral vomers, but Jacobson's organs and their protecting cartilages are *twice as long* as in any types yet examined, and the postero-lateral vomers are almost as well developed as in marsupials, whilst the main vomer is very large. The sphenoid bones are typically Eutherian, but the basisphenoid has beneath it, as in *lizards*, a small "parasphenoid"; this I find only in *G. phillippensis*, and as yet in no other mammal. As in the marsupials, the jugal or malar helps to form the glenoid cavity, and the squamosal is as large as in *Cuscus*, the lowest of the *Eastern Marsupials*. The single flat tympanic bone, with its ossified and compressed meatus, is very remarkable; but this part of the skull corresponds neither with the marsupials nor the insectivores, and this is true also of several other of its characters.

Those things in which it agrees with the marsupials are not the same as in the hedgehog; it differs from both insectivores and marsupials in its own peculiar way, and in some things is more archaic than either. This type appears to me to be a waif from a large group of forms that were beginning to be transformed out of the metatheria into the flying eutheria (Chiroptera), certain of which, this living type among the rest, being arrested at the general level (or platform) of the Insectivora; they are equal to, rather than members of, the order Insectivora. The last type to be mentioned is the Tupaia, an Eastern form, rather high in position, yet combining characters for the first time seen in the Mammalia, namely, a perfect orbital ring, with old metatherian structures, such as the large os-bullæ, the small external and internal pterygoids, and a somewhat absorbed hard palate. The last three kinds, *Rhynchocyon*, *Galeopithecus*, and *Tupaia*, all show a curious mixture of that which looks upwards to the highest types, and of that which has been retained from the lower and more archaic forms of the mammalian class.

Anthropological Institute, February 10,—Francis Galton, F.R.S., President, in the chair.—The election of Douglas W. Freshfield, Lieut.-Col. J. Augustus Grant, C.B., F.R.S., and Cuthbert Edward Peek, M.A., was announced.—Mr. H. H. Johnston read a paper on the people of Eastern Equatorial Africa. The races treated of extend over a region of Eastern Africa lying between the 1st degree north of the equator and 5° to the south, and bounded on the west by the 34th degree of east longitude, and on the east by the Indian Ocean. The forest country on the hills or along the rivers is occupied by resident agriculturists almost exclusively belonging to the Bantu family, ethnologically and linguistically, and the forbidding wilderness in the plains is ranged over by tribes of either Galla or Masai origin, both of which may be roughly classed with the Ethiopic or Hamitic groups. The Wa-taita are of medium height, and have fairly good figures, but the men are somewhat effeminate and slight-looking. In facial aspect there is much variation: the teeth are filed and sharp-pointed, and the ears are so misshapen by prevailing fashion that it is hard to guess at their original shape. The body is disposed to be hairy, but is carefully depilated all over, even to the plucking out of eyebrows, eyelashes, beard and moustache. The hair is allowed to grow only on the occiput, and here it is much cultivated, and pulled out into long strings, which are stiffened with grease and threaded well with beads. There are but slight traces of religion among the Wa-taita. They are afraid of spirits who are supposed to dwell in large forest trees, and perhaps for the reason that their dead are always buried in the forest. Their marriages are arranged first by purchase, but after the preliminaries have been settled, the girl runs away and affects to hide. She is sought out by the bridegroom and three or four of his friends, and when found is seized and carried off to the hut of her future husband. The Akamba, who live to the north of Taita, are a very roving, colonising people, and great hunters. One of the most interesting tribes are the Wa-tarata, who exhibit marked peculiarities in their language and ideas. They are of fair height, some of the men attaining to six feet. They frequently let the beard and moustache grow, and usually abstain from plucking out eyelashes and eyebrows. Circumcision is general. Marriage is a matter of purchase, but no sign of imitating capture seems to be practised here. They number about two thousand, and bear an excellent reputation among the coast traders for honesty and friendliness. Mr. Johnston described some of the chief characteristics of several other tribes with which he had come into contact during his visit to Kilimanjaro, and referred particularly to the languages spoken by the various peoples, one of the most interesting of which is the Masai, which has many characteristics not possessed by most of the other African languages.

PARIS

Academy of Sciences, February 9.—M. Bouley, President, in the chair.—On a new disposition of the revolving mirror for the measurement of the velocity of light, by M. C. Wolf.—On the determination of the ohm by the amortisement method, by M. Mascart.—On the velocity of the detonation in solid and liquid explosive substances, by M. Berthelot.—On the epipodium of some of the gasteropods, by M. H. de Lacaze-Duthiers.—Note on the skeleton of an extinct hyæna (*Hyæna spelæa*) discovered by M. Felix Regnault in the Gargas Cave, near Montrejean, by M. A. Gaudry. This cave hyæna appears to have been scarcely larger than the present spotted species, but the bones were thicker, so that it appears to have been a heavier animal. The author proposes to constitute it a distinct species, as *Hyæna crocuta*.—Remarks on the new volume of the annual series issued by the Observatory of Rio de Janeiro, and presented to the Academy in the name of the Emperor of Brazil, by M. Faye.—On a new refrigerator prepared for the study of physico-chemical pheaomena, by M. R. Pictet.—On the treatment of vines infested by phylloxera with the sulphuret of carbon, by M. P. de Lafitte.—Observations on Encke's comet made at the Paris Observatory (equatorial of the West Tower), by M. G. Bigourdan.—On some remarkable anomalies recently observed in the appearance of the planet Saturn, by Père Lamey.—Observations of the solar protuberances made at the Observatory of the Collegio Romano during the year 1884, by M. P. Tacchini.—Note on the solar parallax deduced from the daguerrotype plates taken by the French Commission for the Transit of Venus in 1874. A new method of calculation, comprising nearly all the observations recorded, by M. Obrecht. The parallax of the sun as determined on these data is expressed by the formula

$$\pi = 8''\cdot 8 - 0\cdot 004\,\delta L,$$

where δL is the correction in seconds of the time for the longitude adopted for the station of Pekin, L = 7h. 36m. 30s.—On a theory of curves aud surfaces admitting univocal correspondences, by M. S. Kantor.—On the equilibrium of a fluid mass to which a movement of rotation has been communicated, by M. H. Poincaré.—On the variation in the electric resistance of bismuth placed in a magnetic field, by M. Hurion.—Temperature of solidification for nitrogen and the protoxide of carbon: relation between the temperature and pressure of liquid oxygen, by M. K. Olszewski.—On the solution of the carbonate of magnesia by carbonic acid, by M. R. Engel.—On the action of sulphur on red phosphorus, by M. F. Isambert.—On the crystals of monazite occurring in the diamantiferous gravels at Caravalles, Province of Bahia, Brazil, by M. H. Gorceix.—On the β-hexachloride of benzine, by M. J. Meunier.—On the sensitiveness of the eye to different degrees of luminosity in the ordinary light usually employed for reading, writing, &c., by M. Aug. Charpentier.—On the modifications produced in the chemical composition of certain secretions under the influence of Asiatic cholera, by M. A. Gabriel Pouchet.—On the physiological action of cocoine, third note, by M. Grasset.—On the physiological action of the sulphate of cinchonamine, by MM. G. Sée and Rochefontaine.—On the optical inactivity of cellulose, and especially of that which is separated from the solution of cotton in the ammoni-cupric reaction, by M. A. Béchamp.—On the *Bacterioidomonas ondulans*, a new organism recently discovered in the intestine of the black rat, by M. J. Kunstler.—On the passage of pathogenetic microbes from the mother to the fœtus, by M. Kourassoff.—On the microbe of typhoid fever in the human system: its cultivation and inoculation, by M. Tayon.—Influence of light on vegetation and on the pathogenetic properties of *Bacillus anthracis*, by M. S. Arloing.—On the veinous circulation of the foot, by M. P. Bourceret.—On the nervous system of the embryos of the Limaceæ, and on the relations of the octocyst with this system, by M. S. Jourdain.—On the nervous system of the Teniæ, by M. J. Meiniec.—On the tetraptera *Tetraplatia volitans*, Busch., by M. C. Viguier.—On the spermato-genesis of the decapod crustaceans, by M. Arm. Sabatier.—On the existence of land mollusks furnished with lungs in the Permian formation of the Saône-et-Loire, by M. P. Fischer.—On a new method of transmitting the mildew of the vine, by M. Fréchou.—Remarks on the late earthquakes in the south of Spain, by M. Macpherson.

BERLIN

Physiological Society, January 16.—Dr. H. Virchow, referring to the results of his investigations into the structure of the eye in different mammalia, communicated those which had reference to the zonula zinnii. He illustrated by diagrams the situation of this organ and the course of its fibres, set forth the various methods of examination, the efficiency of which he demonstrated by a series of preparations, and discussed the different views advanced on the subject of the canal of Petit and the ciliary apparatus. As the result of his researches he found that the zonula zinnii consisted simply of fibres, which at places where they were ranged closer to one another were connected by an intermediary substance, while at those where the fibres kept further aloof from one another no such intermediary substance was present.—Prof. Albrecht from Brussels, as guest, spoke on the morphological significance of the swimming-bladder of fishes. As was known, this bladder was either in open communication with the intestinal tube, or the connection between the two was obliterated, and in this latter case it might well be assumed that the communication in question had existed in earlier stages of development. Many naturalists were of opinion that the swimming-bladder was homologous with the lungs, which likewise represented a tube in communication with the intestinal tube—an opinion, however, decidedly opposed to the views of the speaker. For in all fish the swimming-bladder was placed supra-intestinally, or on the dorsal side, while the lungs are invariably situated infra-intestinally, or on the ventral side of the intestinal canal. If these two organs were homologous, the dorsal organ, in order to its transformation into a ventral, must, by some means or other, have made its passage around the œsophagus. The assumption, however, of either a right-sided or a left-sided passage, or, in fine, of a double division of the swimming-bladder, each of which had wandered downwards on one side, there to form together the two halves of the lungs, was a notion which laboured under difficulties and contradictions. Altogether, in the opinion of Prof. Albrecht, it was erroneous in any case to explain dorsal and ventral organs as homologous, and just as much so in the intestinal canal as in the brain. The swimming-bladder and the lungs were, on the contrary, rather completely heterologous organs. The best argument for the truth of this view was afforded by those fishes which possessed two bladders, a supra-intestinal and an infra-intestinal. Such a phenomenon would be absolutely impossible if these bladders were homologous. In point of fact, in the gymnodonts, diodonts, as well as tetrodonts, there were found a dorsal swimming-bladder, and, beside it, ventral air-sacs proceeding from the œsophagus, by means of which these fish were enabled to inflate themselves. These ventral air-sacs were homologous with the ventral lungs and heterologous to the dorsal swimming-bladders. There were, furthermore, fishes which, of the two protrusions of the intestinal canal, developed only the ventral, while the dorsal became absorbed. Such was the case in Polypterus, which possessed an infra-intestinal swimming-bladder, and in which, therefore, the homologue of the lungs was alone developed. There were, moreover, fish in which both protrusions became absorbed—the dog-fish, for example, which had no swimming-bladder whatever. An interesting support to this view of Prof. Albrecht's was afforded by the fact that, even in the case of mammalia in which the ventral protrusion of the intestinal tube had developed into lungs, remains of the dorsal swimming-bladder were presented in a rudimentary form. Such the speaker took to be the diverticula of the œsophagus, a not uncommon pathologic occurrence in man, which were always dorsal and occupying a position opposite to the entrance into the larynx. These diverticula, according to the experience of surgeons, were not only innate, but also hereditary, a character which certainly witnessed to their phylogenetic significance. These dorsal diverticula of the œsophagus, which occurred only pathologically in man, were a regular occurrence in another mammal, the sow. In swine, therefore, among the mammalia, just as in diodonts and tetrodonts among fish, were found both protrusions of the intestinal tube, the supra-intestinal and the infra-intestinal, existing beside each other, the most indubitable proof of their heterology. Prof. Albrecht proposed calling the dorsal protrusion the swimming bladder, and the ventral the vocal bladder.—Dr. Kossel had from pancreas extract obtained a new base, which belonged to the group of bases obtained by him from the contents of animal and vegetable cells, guanidine, xanthine, and hypoxanthine. From an analysis of 75 kilogrammes of pancreas extract he had procured, besides guanidine and hypoxanthine, a hitherto unknown base, which he was able to separate from the two and obtain in fine crystals. With hydrochloric and sulphuric salts it likewise gave fine large crystals. By reason of its occurrence in the pancreas, Dr. Kossel had called this new base "adenine;" its chemical composition corresponded with the formula $C_5H_5N_5$: it was, therefore, polymeric with hydrogen cyanide, and held the same relation to hypoxanthine, $C_5H_4N_4O$, that guanidine, $C_5H_5N_5O$, did to xanthine, $C_5H_4N_4O_2$. Later on he succeeded in authenticating the presence of adenine in the spleen likewise, as also in yeast, so that this base, too, appeared to have a more general diffusion. Adenine appeared to have an important physiological significance, on account of its composition. It had hitherto been assumed that urea must be derived from a cyanic compound, though such had not been able to be traced in the bodily tissues. Adenine, therefore, in consideration of its constitution, would seem to have some relation to formation of urea, a conjecture which further investigations might settle.—Prof. Bu Bois-Reymond laid before the Society monstrous hoofs of horses and bovine animals sent from the Falkland Islands to the Physiological Institute, which from their massiveness and the turning in of the horny material would, by their appearance, hardly be recognised for the hoofs of horses and bovine cattle.

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